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| 10/573,449 | 01/19/2007 | Akira Takaguchi | 1082/HIROSE | 2452 |
| 27649 | 7590 | 09/22/2010 | EXAMINER | |
| MICHAEL TOBIAS 1629 K ST NW SUITE 300 WASHINGTON, DC 20006 | | | MEHTA, MEGHA S | |
| | | | ART UNIT | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/573,449 | Applicant(s) TAKAGUCHI ET AL. | |
| | Examiner MEGHA MEHTA | Art Unit 1793 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9, 11-17 and 20-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9, 11-17 and 20-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Responsive to amendment of August 30, 2010, and supplemental to the action mailed August 31, 2010.

Response to Amendment

2. The Declaration under 37 CFR 1.132 filed August 30, 2010, is insufficient to overcome the rejection of claims 9, 11-17 and 20-28 based upon 35 U.S.C. 103(a) over Kabe in view of Gerstenberg as set forth in the last Office action (and reproduced below) for the following reasons.

Professor Garriss argues that Gerstenberg shows nothing to explain how the benefits of his invention are related to the number of blades. Furthermore, the uniform temperature and pressure benefits are not necessary for a solder pump, and pumping efficiency is not mentioned by Gerstenberg but is important to Applicant. However, these particular arguments are not relevant to the validity of the Kabe-Gerstenberg combination. It is not necessary for Gerstenberg to teach a benefit of a particular aspect of his invention (multiple blades) or to have the same motivation as Applicant in order for the combination to be valid.

The only requirement for two references to be combined is either 1) the reference must be in the same field of endeavor or 2) the references must be reasonably pertinent to the problem with which Applicant is concerned. In this case, Applicant is concerned with pump performance based on number of blades. Gerstenberg clearly teaches that multiple blades are known and can be beneficial. In fact, Gerstenberg specifically teaches that 2-5 blades are preferred. Why Gerstenberg wants 2-5 blades is not of relevance to the combination, only the fact that he does.

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Professor Garris further argues that the viscosity of the materials pumped by Gerstenberg is completely different than that of molten solder. However, just because Gerstenberg uses his pump for particularly viscous materials does not mean that Gerstenberg's pump wouldn't be used for less viscous materials. Further, Professor Garris admits that it is not clear for what reason Gerstenberg has multiple blades (Declaration page 5, first paragraph). Thus, it is not unreasonable to assume that a multiple blade pump would be capable of effectively pumping lower viscosity fluids as well.

Professor Garris submits data showing unexpected results. However, the data provided, both the comparison of 2 and 4 blade pump height based on rpm and the comparison of 1 and 4 blade pump wave height over time, are insufficient to show unexpected results. In order to show unexpected results, one must show a particular trend based on the number of blades, and then show that a four-blade pump defies what would normally be expected based on the trend, and instead creates a much improved product that is completely unexpected. Thus, more than two points per graph are needed to show this trend and the expected results for a four blade pump. For example, Applicant could show data for 1, 2 and 3 blade pumps, establish a trend and then show that four blades does not follow the trend to establish unexpected results.

Finally, the Examiner would like to point out that the statements provided by Professor Garris are regarding the beneficial/detrimental effects of more blades balance and the calculation of an optimum flow efficiency show that an optimum number of blades may well be a result effective variable. If one can apply the benefit from a single blade system to a double blade system, it would be reasonable for one to further try other numbers of blades until the detrimental effects outweigh the beneficial effects of multiple blades.

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The following rejection, a reproduction of that mailed on August 31, 2010, still stands.

DETAILED ACTION

Note

1. Please note that claim 20 recites "... a multiple-blade screw-type pump having a multiple-blade screw-type pump having an impeller..." The Examiner is unsure if this is the language that is meant, or if "multiple-blade screw-type pump" has been accidentally repeated. Please correct if required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 9, 11-17 and 20-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 62-259665 Kabe in view of WO 03/048579 Gerstenberg (refer to US 7,165,933 for translation).

Regarding claim 9, Kabe teaches a wave soldering tank **2** comprising a soldering tank body for housing molten solder **8**, a solder feed chamber disposed within the soldering tank body and having an inlet disposed below the level of molten solder and an outlet disposed above the level of molten solder in the soldering tank body and a screw-type pump **23** comprising an impeller having a rotatable hub and blades secured to the hub disposed in the inlet so as to draw

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molten solder into the solder feed chamber through the inlet and discharge molten solder through the outlet (figure 1 and abstract).

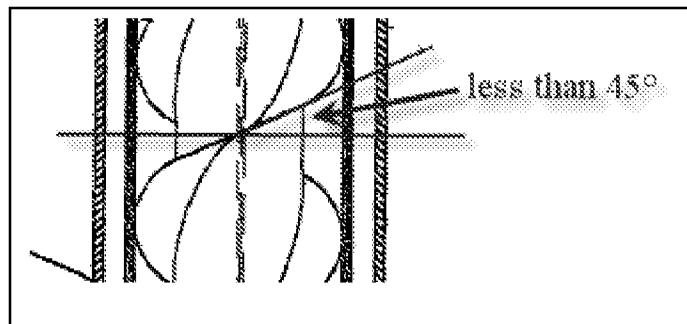
Kabe does not teach a multiple blade screw with at least four helical blades.

Gerstenberg teaches a multiple-blade screw-type pump has at least 4 helical blades (column 3, lines 63-67) enclosed in a casing that is used to transport a viscous liquid. While Gerstenberg's apparatus is outside Kabe's field of endeavor, it is analogous because both use screw pumps enclosed in cylindrical casings for forcing a viscous liquid through a pump to move it from one location to another. "Thus a reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole," (MPEP 2141.01 Section I).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the multiple-blade screw pump with at least four helical blades of Gerstenberg in the method of Kabe because the multiple-blade pump more efficiently and effectively transports the viscous liquid than would a single-blade pump.

Regarding claim 11, Gerstenberg teaches that each of the blades overlaps an adjoining one of the blades when the blades are viewed in the axial direction of the impeller (figure 1).

Regarding claim 12, Gerstenberg teaches that the blades are provided at equal intervals in the circumferential direction of the hub (column 3, line 63 -- column 4, line 4), each blade extending around the hub by



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at least 120° between first and second ends of the blade (figure 1).

Regarding claim 13, Gerstenberg teaches that each of the blades is sloped by at most 45° with respect to a plane perpendicular to a rotational axis of the hub (shown in figure 1 above).

Regarding claim 14, Kabe teaches that the solder feed chamber comprises a partition 6 which divides the interior of the soldering tank body into an upper and lower portion, the inlet comprises an opening formed in the partition (figure 1), and the pump includes an impeller and a cylindrical casing disposed in the inlet and surrounding the impeller, the impeller being rotatably disposed in the casing so as to transport molten solder in an axial direction of the casing (figure 2).

Regarding claim 15, Kabe teaches that the solder feed chamber includes a duct which extends upwards from the partition and a nozzle disposed at an upper end of the duct and extending above the surface of molten solder in the soldering tank body (figure 1).

Regarding claim 16, Kabe teaches that a lower end of the impeller extends below a lower end of the casing (figure 2). Kabe does not explicitly teach the extension amount. However, it would have been within the purview of one of ordinary skill in the art at the time of the invention to decide how far the lower end should extend based on the desired flow path and bath dimensions.

Regarding claim 17, Gerstenberg teaches a clearance between the casing and the impeller is 0.1-1mm (column 4, lines 22-25).

Regarding claim 20, some of the limitations are taught above with regard to claims 9 and 14. Kabe further teaches a horizontal partition 6 extending across the tank body below the level of molten solder in the tank body, the partition having first and second openings horizontally

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spaced from each other, a bowl-shaped guide secured to a lower side of the partition and having curved surfaces for guiding fluid beneath the first and second openings, a nozzle having a lower end in fluid communication with the second opening in the partition, the pump having an impeller disposed so as to draw molted solder downwards through the first opening into a space between the partition and the bowl-shaped guide (figure 1).

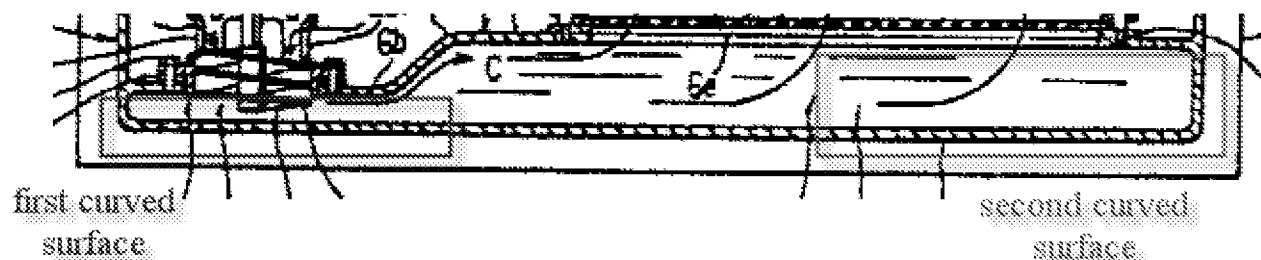
Regarding claim 21, Kabe teaches that the impeller is disposed in the first opening of the partition (figure 1).

Regarding claim 22, Gerstenberg teaches that the impeller includes at least four helical blades (column 3, line 63 -- column 4, line 4).

Regarding claim 23, Kabe teaches a duct extending upwards from the partition above the second opening and communicating between the second opening and the lower end of the nozzle (figure 1).

Regarding claim 24, Kabe teaches that there are no obstructions to flow of fluid between the pump and an interior of the nozzle (figure 1).

Regarding claim 25, Kabe in view of Gerstenberg teaches most of the limitations with respect to claims 20 and 19 above. With respect to claim 29, Kabe further teaches that the blades are disposed in the tank body below the level of molten solder in the tank body and a casing surrounding the impeller and having a lower end fluidly communicating with an interior of the



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nozzle along an unobstructed flow path (figure 1).

Regarding claim 26, Kabe teaches that each curved surface extends beneath one of the openings from the lower side of the partition towards a bottom of the guide (figure 1 above).

Regarding claim 27, Kabe teaches that each of the curved surfaces comprises an end wall of the guide (figure 1 above).

Regarding claim 28, Kabe teaches that a portion of each opening is disposed directly above one of the curved surfaces (figure one above).

Response to Arguments

4. Applicant's arguments filed August 16, 2010, have been fully considered but they are not persuasive.

Applicant argues that Kabe and Gerstenberg are not analogous references because the emulsion of Gerstenberg is an entirely different material from that of Kabe. Furthermore, the viscosity of Gerstenberg's emulsions is entirely different from the viscosity of molten solder. However, Applicant seems to be missing the point. As explained above, these references are analogous because they are both using screw pumps enclosed in cylindrical casings for forcing a viscous liquid through a pump to move it from one location to another. The Examiner agrees that the materials are different and the viscosities are different, but the concept still applies. It would not be unreasonable to expect one of ordinary skill in the art at the time the invention was made to look to Gerstenberg to improve the pumping functions of solder tank impellers. More blades means that each blade has to do less work. It naturally follows that the pumping action would be improved.

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Applicant also argues that Gerstenberg does not teach the motivation of more blades being preferable. However, this is irrelevant. The reference need not explicitly teach a particular motivation in order to be used. One of ordinary skill in the art would be able to look at this reference *at the time the invention was made* and appreciate the variety of uses and applications for a particular improvement, regardless of whether or not this was mentioned or even recognized by the author of the reference *at the time the reference was published*.

Applicant argues the invention provides unexpected results. However, Applicant is reminded that evidence must be supplied in the form of an Affidavit or Declaration to be considered.

Applicant argues that the "curved surfaces" that appear in the figures of Kabe are not actually curved surfaces. However, the description provided in the arguments (pages 11-12) does not explicitly state that the corners of the tank are sharp. Although the sides are welded to the bottom, it is reasonable to expect some form of curvature, generally in the form of filler material that has solidified in the joint. The text provided is not enough to necessitate sharp corners in the tank. Therefore, the Examiner will maintain her position regarding the curved surfaces at the bottom of the tank.

Applicant argues that baffle plate **50** obstructs the flow of the solder. However, the baffle plate has holes. Solder flows through the holes unobstructed. If there was an obstruction in the flow path, solder would not flow at all. If Applicant wishes to claim the absence of a baffle, the Examiner suggests that Applicant claim precisely that, as "no obstructions to flow" requires only one solder molecule to make its way from the impeller to the nozzle, showing that the tank "comprises... no obstructions to flow".

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEGHA MEHTA whose telephone number is (571)270-3598. The examiner can normally be reached on Monday to Friday 8:30 am to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emily Le can be reached on 571-272-0903. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Emily M. Le/
Supervisory Patent Examiner, Art Unit 1793

/Megha Mehta/
Examiner, Art Unit 1793